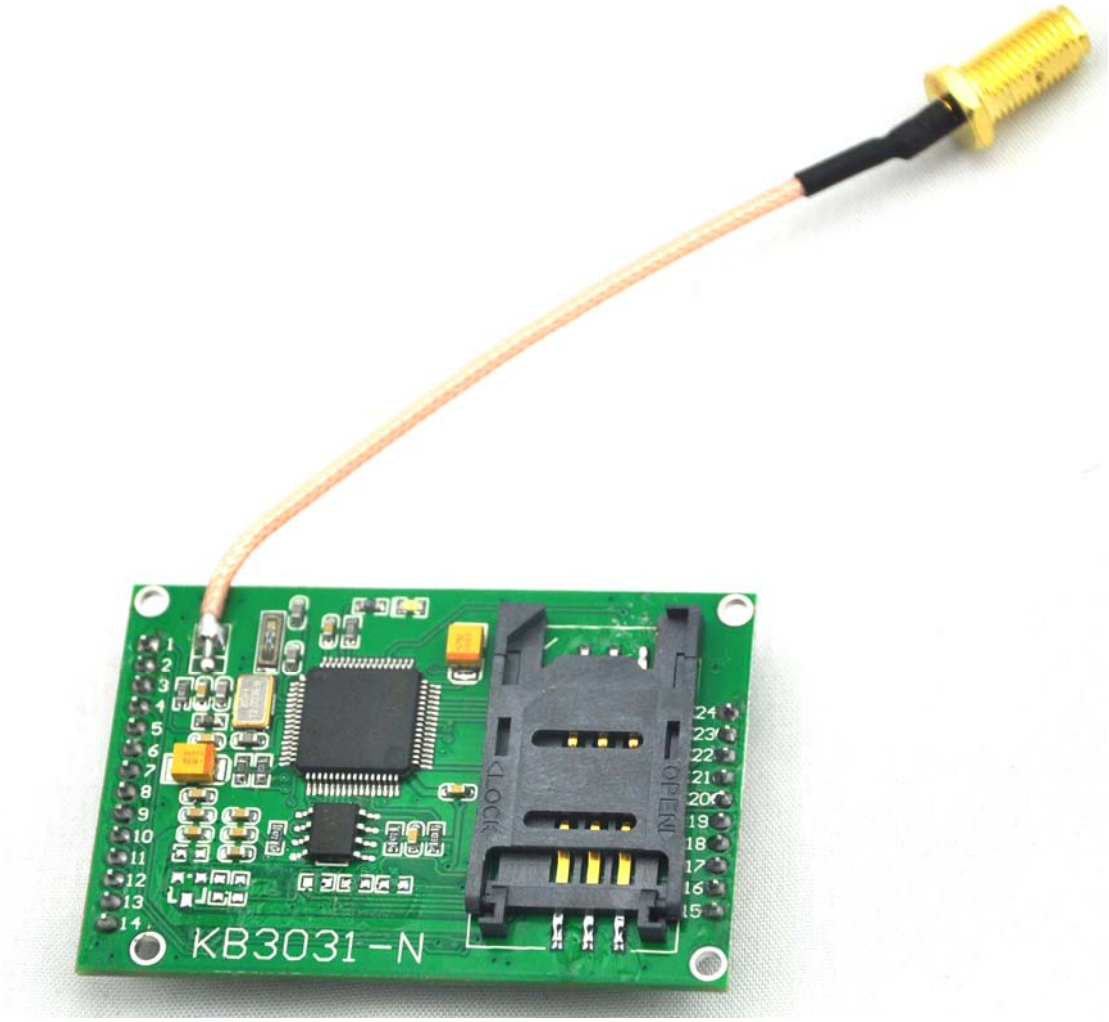
KB3031-NF GPRS DTU
User Manual



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1 Brief Introduction

Thanks for you to use our products!

1.1 Brief Introduction

KB3031-NF embedded GPRS DTU (Data Terminal Unit) is wireless data transmitting terminal of GPRS/SMS and embedded with High reliable ARM7 CPU. It is applicable to small and medium data transmitting of the Center to multi-points, multi-points scatter.

Based on the public net, KB3031-NF GPRS DTU transmit widely, stably and reliably, KB3031-NF GPRS DTU is widely used in unattended operation device, Remote AMR, remote data acquisition, remote AMR, remote scheduling and so on. Due to this product is designed for industry integrated, we adopt special designs in the temperature scope, shaking, EMC and interface multiform and so on, to keep it good stability in the severe atmosphere, ensure high quality for your device.

GPRS mobile net can supply TCP/IP connection; GPRS DTU can be use for internet connection, data transmitting application and so on. KB3031-NF GPRS DTU (Data Terminal Unit) is special GPRS wireless device that send the data from COM port through GPRS mobile data network. Aim at different scope user's requirements to supply different define GPRS Terminal unit, it needs taking industry characteristics for developing on hardware & software and system integration.

KB3031-NF GPRS DTU is used in electric power automatic system, industry monitoring, traffic management, atmosphere, pro-environment, pipe network monitoring, finance, securities departments and so on. Consider the networking request from different application scope, achieve Virtual data private network in network structure.

1.2 Product Feature

- Standard industrial products, EMC anti-jamming design, strong adaptiveness.
- Independent research and develop, embedded 32 bit ARM7-CPU with real-time operating system.
- Embedded Watchdog chip, provide multiple Reset mechanism, can be controlled by software, achieve industrial security mechanism perfectly.
- Working Frequency adopt 850MHz/900MHz/1800MHz/1900MHz which is suit for every country all over the world (Including North America and South America);
- Advanced and strict data communication protocol, with the function of correction and encryption. Never lose package when data transmission, can achieve pictures over than 100K and Flash animation files transmission, no Mosaic happened.

- Various working mode: DTU (default), Modem, SMS Modem. DTU mode is GPRS data transmission which can get the data from device's COM port (RS232/RS485/TTL) and transmit to the server in Internet. It also can receive SMS Message when DTU mode (it needs to switch IO port to SMS when send message). SMS Modem is SMS transmission mode, user can set to type A (with protocol) or type B (transparent). When set to Modem, compatible standard AT commands (GSM07.05 and 07.07). User can write AT command software to realize the function user need.
- DTU and SMS Modem can switch through User configuration software and also can change the working modem through IO port.
- SMS Modem feature:
  - Various networking ways: Under SMS Modem, the device with protocol (A) can network with the device without protocol (B), the device with protocol (A) also can network with the device with protocol (A).
  - Under SMS Modem, KB3031-NF can receive and send the MAX data 1024 bytes a time.
  - Under SMS Modem, support Sending and Receiving Data form: hex, ASCⅡ, UCS2. User is advised to set this parameter through our configuration software before use it.
- Various networking ways: KB3031-NF can work with NET Converter KB2000 and KB3031-NF (it is convenient to use GPRS without internet). This can achieve networking of peer to peer, center to multi-points.
- Plug and play: when work with KB2000 or KB3031-NF of our product, no need to develop any software and hardware, can build large SCADA system.
- Automatically IP register mechanism, can achieve various server modes, build complete super large SCADA system.
- Remote sleep and awake: User can use appointed cell phone number to dial or send message can sleep or awake DTU, it is convenient for user to save a lot of GPRS Flow Fee when no need to use DTU.
- Remote modify DTU parameters: Support that SMS and data service center modify DTU parameters.
- IO switching value function: Two switch inputs, two switch outputs. Through gprs network or SMS to control the state of the switch input or query switch input. Remotely turn on the alarm, set the input alarm mode (gprs alarm and SMS alarm) and alarm threshold (low level alarm or high level alarm), the user also can customize the alarm information content.
- Powerful communication backup function: if you open an alternate service functions, the main server and backup server connection can automatically switch, and automatically connect to the backup server once the main server problems.
- Strong server software support, application for many years, strong function.
- Support fixed IP and DDNS, support special APN;

- Support up to four servers synchronization function, if open GPRS server synchronization function, KB3030-N can register four servers at the same time, and to communicate with each other.
- Supports up to 20 SMS control numbers.
- Working temperature range: -40℃-80℃, communication is not effected at -40℃.

1.3 Safe Use

KB3031-NF GPRS DTU Completely complied with national radio product safety technical regulations.

Warm Tip: You must not touch the antenna with your hands or body. During 15 seconds after KB3031-NF DTU started, Please keep away from the antenna. If the antenna is damaged, you must replace it in time, assorted and qualified cable and antenna.

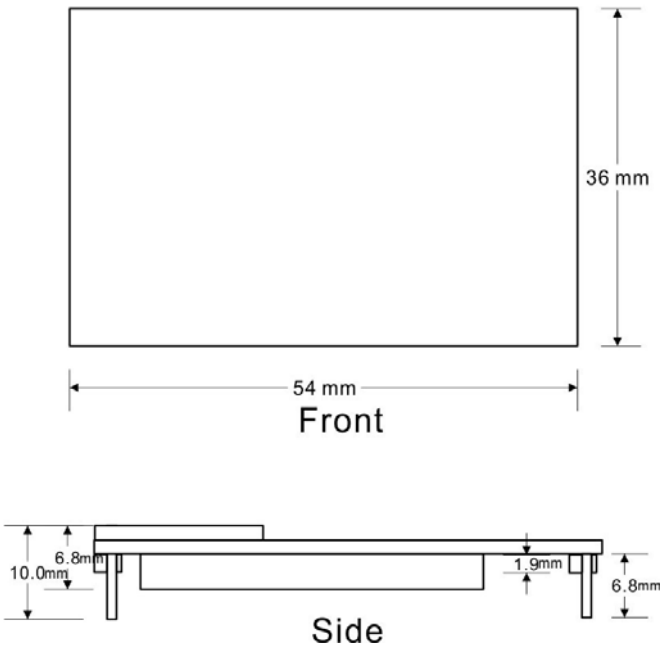
1.4 EMI

Now most electric device all has electromagnetic pulse hardening, but some old device may have no, under RF power radiation, it may go wrong. When you use KB3031-NF GPRS DTU, please check the device nearby have electromagnetic pulse hardening or not.

1.5 Appearance and Interface

. Size: 54mm (L) * 36mm (W) * 10mm (H)
Pin space: 2.0mm
.Weight: 17g

KB3031-NF Size



2 Technical Specification

2.1 GSM/GPRS:

Frequency Band: GSM850MHz/EGSM900MHz/DCS1800MHz/PCS1900MHz
GPRS Multi-slot Class 12
GPRS Mobile Station Class B
GPRS Coding: CS1~CS4
Output Power: Class 4 (2W) at GSM850MHz and GSM900MHz
Class 1 (1W) at DCS1800MHz and PCS1900MHz
Sensitivity: <-107 dBm (typ.) at GSM850 MHz <-107 dBm (typ.) at GSM900 MHz <-107 dBm (typ.) at DCS1800MHz <-107 dBm (typ.) at PCS1900MHz
Compatible standard AT command（GSM07.05 and 07.07）
Support extend command
Support SMS、USSD、CSD
Embed TCP/IP Protocol

2.2 Basic Function:

Embed TCP/IP Protocol
Embed standard AT command（GSM07.05 and 07.07）
Support extend command
Support SMS、USSD、CSD
Transparent data transmitting
Support IP address or domain name
Support special APN

2.3 User Interface

1. Interface

Pin No.	Definition	Description	Remark
1	RST	Reset	
2	CTS	Clear to send	
3	DTR	Data terminal ready	
4	RTS	Request to send	
5	GPRS/SMS	GPRS or SMS optional	
6	Output1	Output no.1	
7	Output2	Output no.2	
8	Input1	Input no.1	
9	Input2	input no.2	
10	TXD	Serial port TXD (DTU→Device)	RS232 or TTL interface sending
11	RXD	Serial port RXD (Device→DTU)	RS232 or TTL interface receiving
12	STATUS	Module working statue indicative terminal	
13	DCD	Data ready	
14	RI	Rang the bell detection	
15	SIM_RST	The Reset of SIM card	Optional, if you need to set SIM case in your product, can use PIN 15, 16 17 18.
16	SIM_CLK	The Clock of SIM card	
17	SIM_VDD	The power supply of SIM card, Max current flow is 10mA	
18	GND	Ground	
19	GND	Ground	
20	VBAT	DC positive input terminal, input voltage 5V-12V	
21	VBAT	DC positive input terminal, input voltage 5V-12V	
22	VOUT	Output 3.9V	
23	GND	Ground	
24	SIM_DATA	SIM card data Pin	

Pin statements

RST: The terminal is reset pin; giving RST a low level can reset KB3031-NF.

CTS: Hardware flow control pin, Clear to send.

DTR: Hardware flow control pin, Data terminal ready.

RTS: Hardware flow control pin, Request to send.

GPRS/SMS: GPRS or SMS optional Pin, when set it high, then work in GPRS for communication; when set it low, then work in SMS for communication.

Output1: IO output terminal, the IO terminal is standard 2.8V electrical level, can use to output high or low electrical level.

Output2: IO output terminal, the IO terminal is standard 2.8V electrical level, can use to output high or low electrical level.

Input1: IO input terminal, can input standard 3.3V electrical level, for monitoring statue.

Input2: IO input terminal, can input standard 3.3V electrical level, for monitoring statue.

TXD: Serial port output terminal, connect with user's serial port receiving point; Baud rate: 300 ~ 115200 BPS;

RXD: Serial port input terminal, connect with user's serial port output point; Baud rate: 300 ~ 115200 BPS;

STATUS: Statue indication, when high electrical level, it means module start and enter to work status; when low electrical level, it means module is closed; when its configuration mode, the pin is high level.

DCD: Hardware flow control pins, the data is ready.

RI: Hardware flow control pin, rang the bell detection.

SIM_RST: The Reset of SIM card, if users needn't user-defined SIM case, then hangs the feet in the air.

SIM_CLK: The Clock of SIM card, if users needn't user-defined SIM case, then hangs the feet in the air.

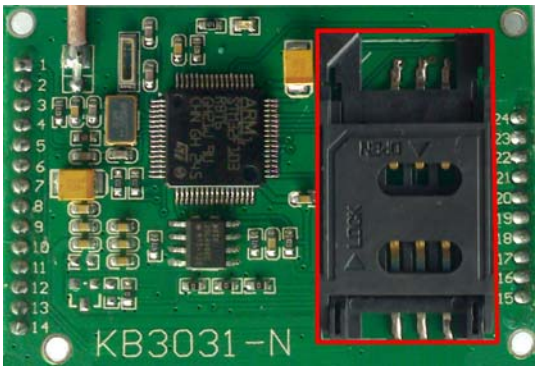
SIM_VDD: The power supply of SIM card, Max current flow is 10mA, if users needn't user-defined SIM case, then hangs the feet in the air.

GND: Module ground,

VBAT : system power supply positive electrode, The foot voltage range:5VDC～12VDC; Under the poor signal, the peak point current can reach 1.5A. When PCB designing, we suggest line width: ≥40mil, The voltage is influential if serial interface is TTL voltage, when users need 5V TTL serial ports level, here must provide 5V power supply;

VOUT: 3.9V electrical level output pin, user can use directly

2. SIM card connector



Please open the SIM Holder cover, put the SIM card to right position, then close and lock the SIM Holder cover;

Note: Please do not plug SIM card when DTU is power on, please power off the product before plug the SIM card.

2.4 Electric Specificity

Work Voltage: DC 5V-12V
Power:
Standby: < 25mA@5V
Communicating: < 120mA@5V
Peak point current: 1.5A@5V

2.5 Circumstances Specificity

Working Temperature: -40℃～80℃
Storage Temperature: -45℃～125℃
Relative Humidity： 20%~ 95%（No Condensation）

3. Product Installation

3.1 Overview

KB3031-NF GPRS MODEM must correct installation just can achieve design functions, usually equipment installation must be approved in our company under guidance of qualified engineers.

Note: please don't charged when install KB3031-NF GPRS MODEM.

3.2 Unpack

For transportation safety, usually KB3031-NF GPRS MODEM needs reasonable packaging, when you please keep unpacking packaging materials used for future need transshipment. KB3031-NF GPRS MODEM includes the following parts:

KB3031-NF Embedded style GPRS DTU 1 pcs
Stick antenna or magnetic antenna (SMA interface) 1 root
KB3031-NF Special connection wire 2 root

When unpacking the case, check the specific items according to the packing of user's ordering contract.

3.3 Antenna and SIM card installation

Antenna support SMA female pedestal, spin the left from Modem and lock it.

Note: Please don't power-on KB3031-NF when connecting with the antenna and install SIM card.

3.4 Inspect network situation

Connect cable and antenna, insert into available SIM card, power-on KB3031-NF, the power light of MODEM will flash, after 10 seconds later, the power light will always light, it means KB3031-NF is into a normal work condition and connect with network successfully.

Note:

Before power-on, must confirm KB3031-NF connect with cable correct;

Before power-on, make sure to connect the antenna, to avoid RF impedance mismatch and damage module.

4 Working mode switch

KB3031-NF default value is DTU modem, the way of switch working mode as below:

1. Switch to SMS modem: it has two ways, when under DTU mode, can change the device type to SMS modem when set DTU parameters. Another way is that switch the IO port (put the Pin 10 to low) to change the working mode.

2. Switch to Modem mode: Enter configuration mode, parameter configuration software provided by our company to be able to switch the device to modem mode.

3. Switch to DTU mode: there are four ways:

1) When under SMS Modem, through the IO port switch, the terminal Pin10 is set high.

2) In the configuration mode, using our company providing parameter configuration software can switch the device to the DTU mode.

3) When product works under DTU mode, user can switch the work mode by SMS or GPRS network.

4) When product works under SMS mode, user can switch the work mode by SMS.

5. DTU parameter configuration

KB3031-NF parameter configuration way include: Serial, SMS, GPRS network.

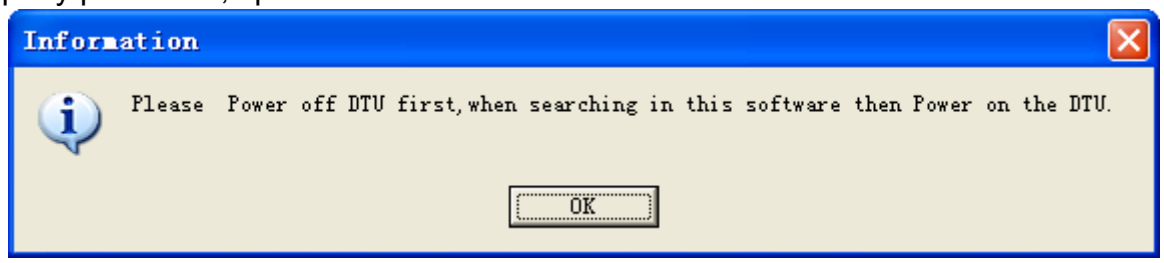
5.1 Change DTU parameter by COM port

Through the serial port to configure parameter of KB3030-N,first you need to obtain the serial port configuration software(GPRS_DTU.exe) from our company(when delivery goods along with this software to you),the start of the software default parameters to configure the DTU.

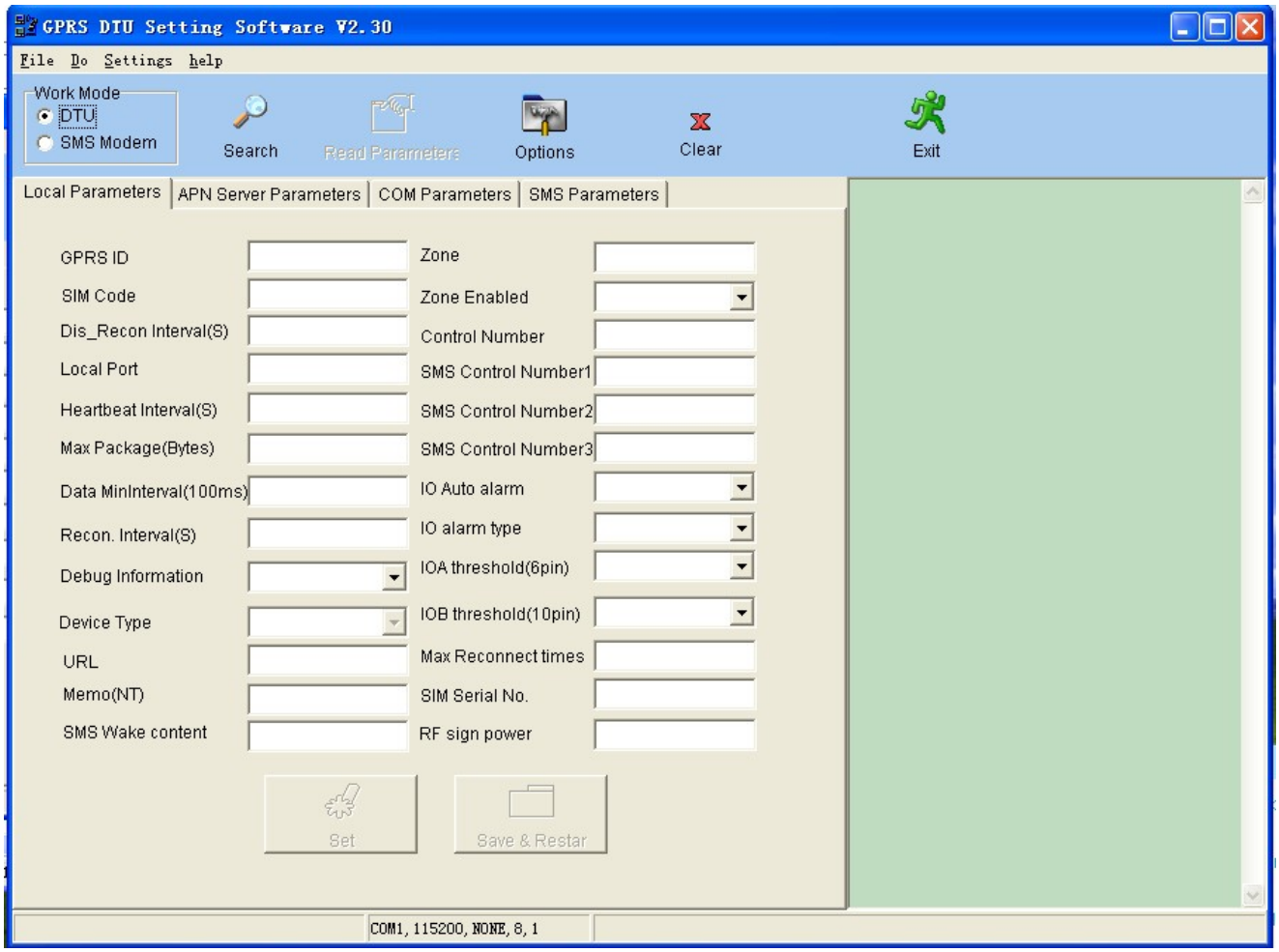
Operating step:

1. Connect KB3031-NF to PC's COM port through the development board or conversion circuit.

2. Run configuration software GPRS_DTU.exe (software version upgrade ceaselessly, you can get the latest version of the configuration software from our website or our company personnel, tips are as follows:



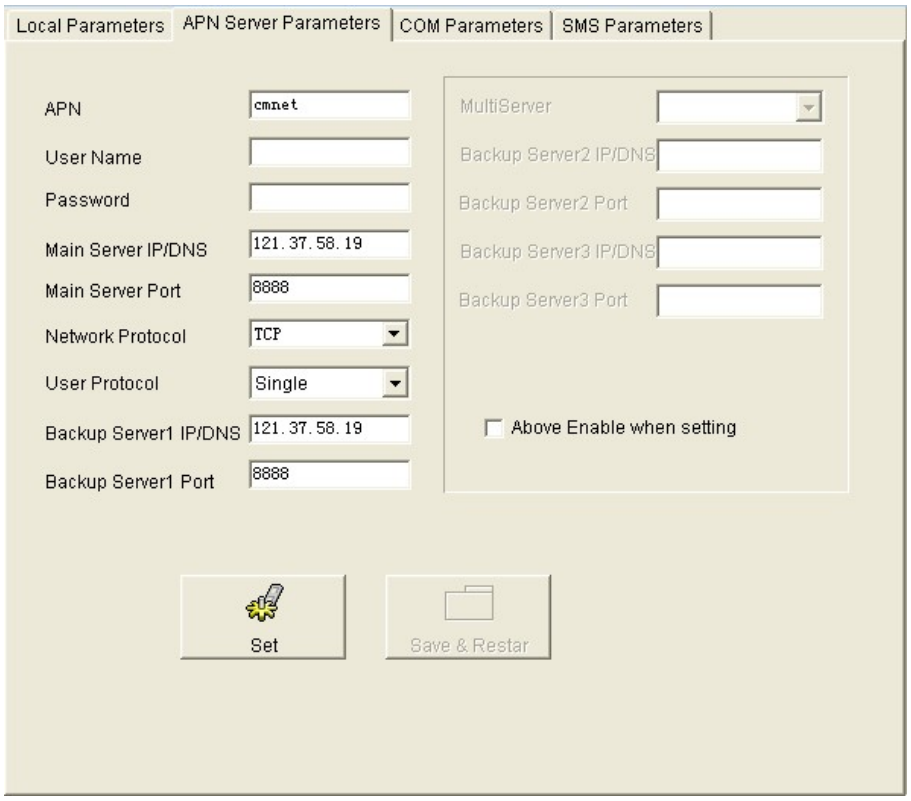
Click OK, and enter the interface configuration software, as follows:

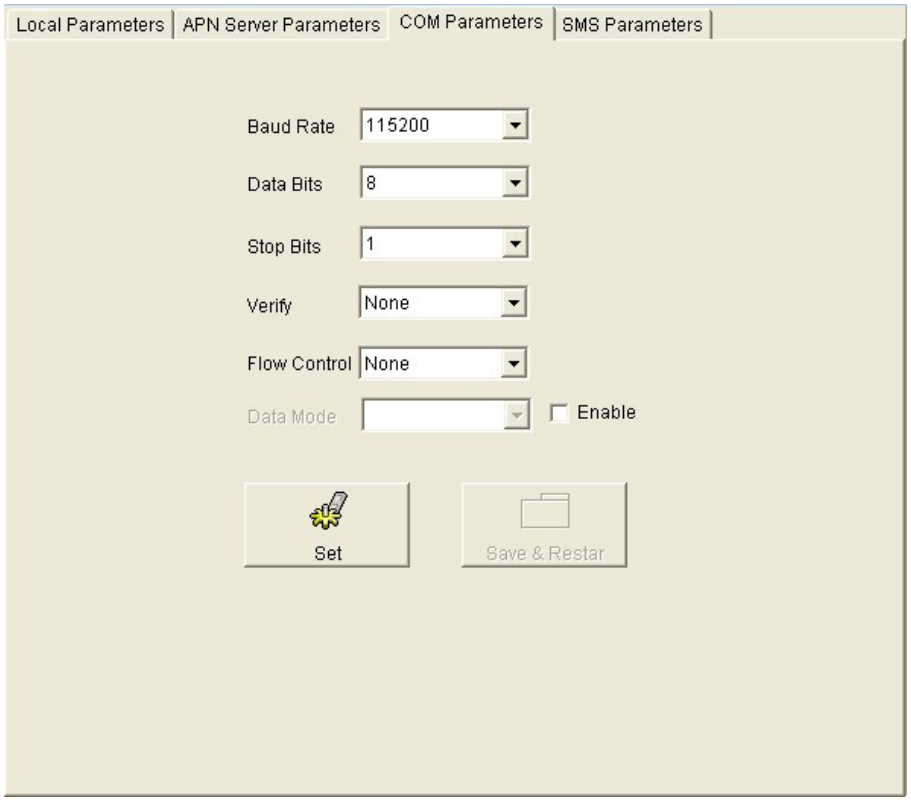


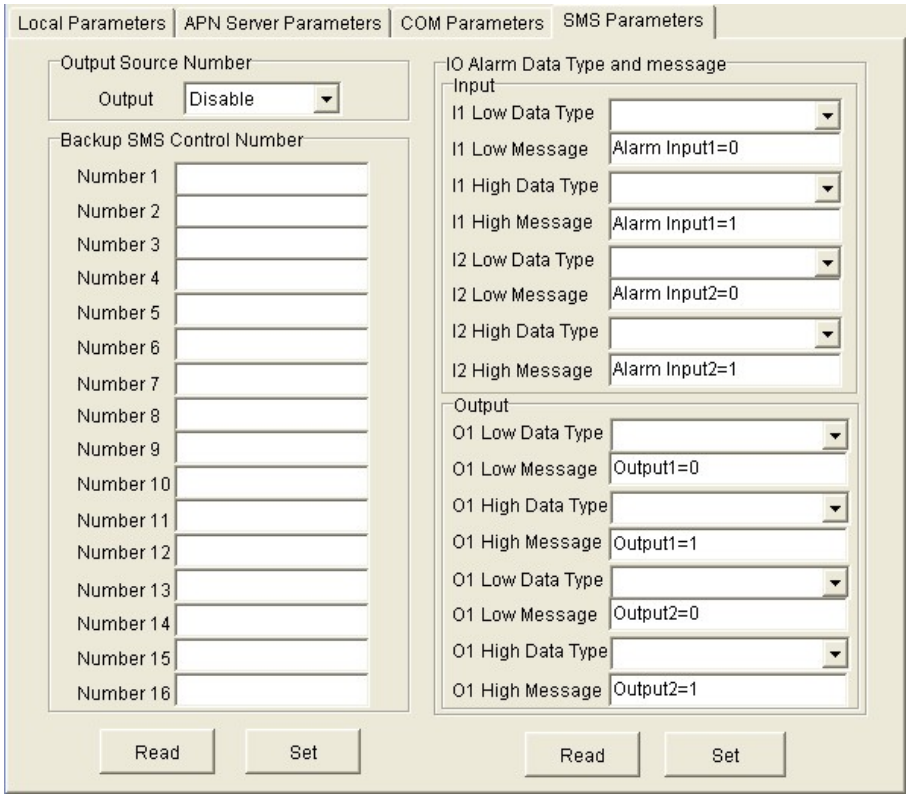
3. This software will automatically open corresponding serial search DTU, processing, please confirm whether the serial port which opened by software is the serial port connected with KB3031-NF DTU, if not, please click the “stop” button in toolbars in the menu options from the file, then change information in COM parameters settings window. (Note: configuration parameters are fixed by 115200bps)

4. Connect the KB3030-N to the power supply, the system will prompt that search DTU successfully in 5 seconds, and the user can obtain the current product firmware library verion information through the pop-up dialog box information (a new version of the configuration software to support this feature). As shown below:

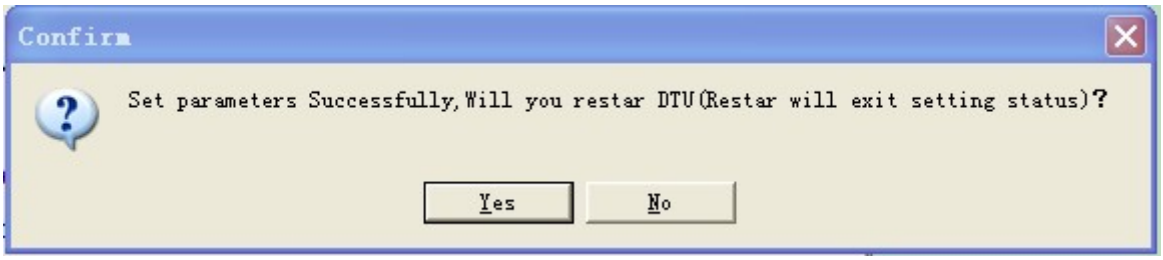
5. Click Read in toolbars, the software will read the parameters, and the display the parameter of DTU.


Local Parameters
APN Server Parameters
COM Parameters
SMS Parameters
APN
cmnet
User Name
Password
Main Server IP/DNS
121. 37. 58. 19
Main Server Port
8888
Network Protocol
TCP
User Protocol
Single
Backup Server1 IP/DNS
121. 37. 58. 19
Backup Server1 Port
8888
MultiServer
Backup Server2 IP/DNS
Backup Server2 Port
Backup Server3 IP/DNS
Backup Server3 Port
Above Enable when setting
Set
Save & Restar


Local Parameters
APN Server Parameters
COM Parameters
SMS Parameters
Baud Rate
115200
Data Bits
8
Stop Bits
1
Verify
None
Flow Control
None
Data Mode
Enable
Set
Save & Restar



Note: After set or change the parameter and clink “SET”, Software will prompt:



Now, if you need to change others parameter, please choose NO, after changed others parameter, then click Set, will prompt it again, DTU will restart, and exit the Parameters configuration state after choose Yes, If you need to change parameter again, you should to outage DTU and re-search after Power-on.

5.2 SMS Modem Parameter Configuration

You are advised to use the configuration software (GPRS_DTU.exe) to set parameters (We will provide this software in CD with product).

Operation steps:

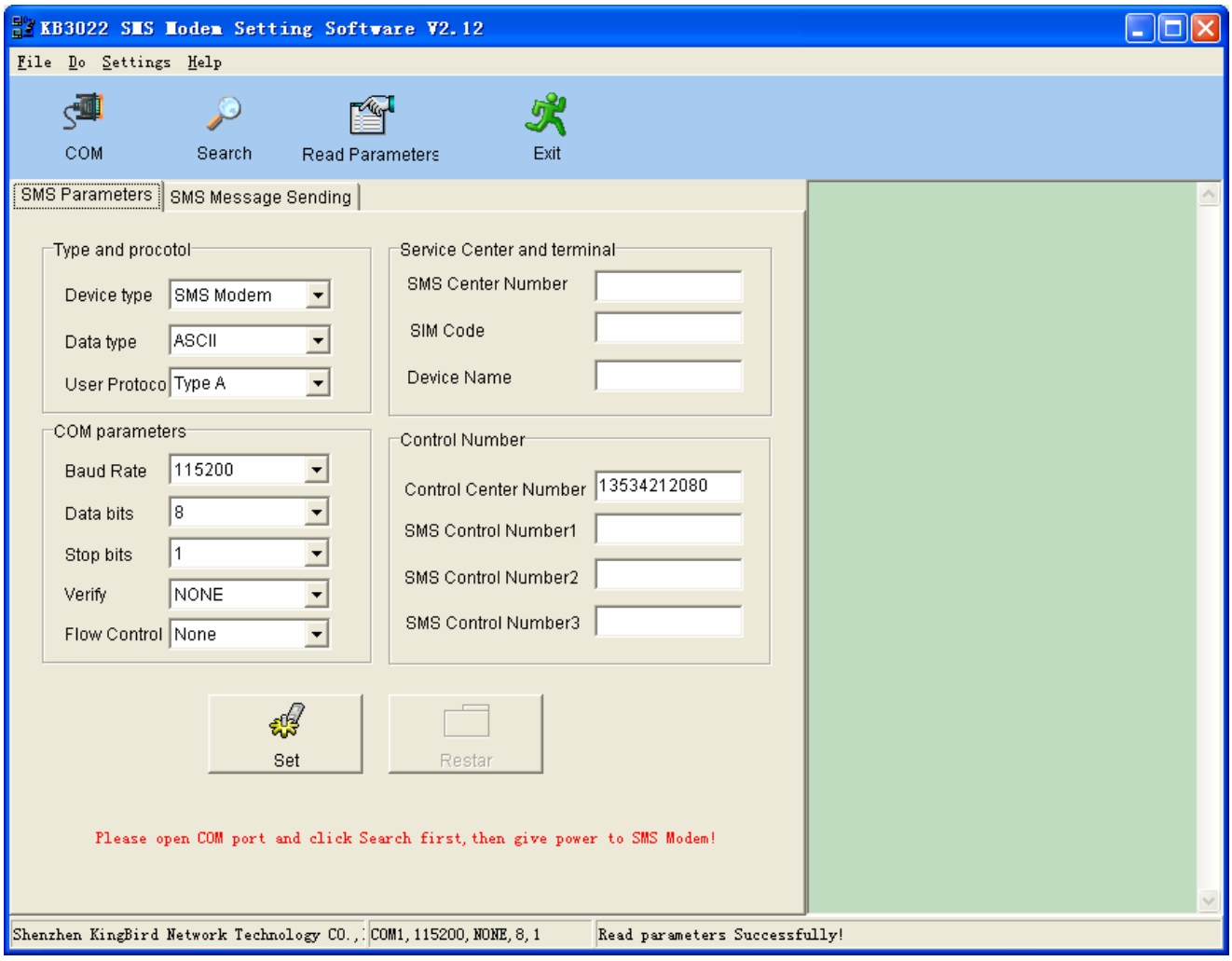
1. Connect the COM port of KB3031-NF with PC's;

2. Run configuration software: GPRS_DTU.exe, software will prompt that close DTU of power, click "OK", enter the main interface software, click "Stop" to stop searching, choose device type to SMS Mdoem, click "Search"

Choose a COM which SMS Modem need to connect (such as COM1), then click the "search" button, enter search state (note: when using configuration parameters are fixed 115200bps). Tip as 4.1,

3. Connect the KB3031-NF to the power supply, the system will prompt that search SMS Modem successfully, Click Read Parameters, the software will read the parameters, and display the parameter.

4. After set the parameter, click "Set" to save, click "Restar", then power off, and power on again.



Parameters:

Equipment types: Three types as DTU, SMS Modem and Modem, DTU is for GPRS data transmission, when under DTU mode, it can make TCP/IP connection with server in Internet, and for data transmission. When set to SMS Modem, special use to the sending and receiving messages. When set to Modem, through AT instructions users can achieve dialing, Internet, making phone calls, use of messages and so on. (Note: Modem can't switch by this way; it only can switch through AT command when power on)

Data types: When KB3031-NF work as SMS Modem, users can set message's data coding way as HEX (hexadecimal), ASCII and USC2 (Unicode). Generally, HEX is used for the communication of instrument equipment; ASCII be used to transfer ASCII characters, sending and receiving messages with mobile phone; USC2 is Unicode coding method for transmission, for user transfer Chinese characters or other countries double byte or more bytes words, support sending and receiving messages with mobile phone.

User protocol: When KB3031-NF work as SMS Modem, users can set to type A (with protocol) or type B (transparent). KB3031-NF with Type A can send information to multiple KB3031-NF with type B, the target number picked from the protocol send by user terminals; KB3031-NF with type B can only send the information to the designated record phone number, the default number is Control Number, when KB3031-NF with type B received message from one of Control Number, SMS control number 1, SMS control number 2 and SMS control number 3, KB3031-NF with type B will set this number as target number automatically.

Band Rate: KB3031-NF COM port support from 300 to 115200bps.

Data bits: The data bits of GPRS DTU COM data, scope: 5-9.

Stop bits: The stop bits of GPRS DTU COM data, scope:1-2.

Verify: The type of checking GPRS DTU COM data, support None, Even, Odd, Mark, Space (Can't realize Mark, Space)

Flow Control: Com data transmission support none flow control, hardware flow control (Support RTS and CTS hardware flow, if user need this interface, user is advise to declare it when place order), software flow control.

Service center number: When KB3031-NF work as SMS Modem, use the message service center number, generally user can get it through the network by automatic, user also can set it manually.

SIM code: The SIM card number is only for user recorded (not for communication).

Device name: The Device name is only for user recorded (not for communication), user can name KB3031-NF through this parameters.

Control number: When KB3031-NF work as SMS Modem and set to type B, after KB3031-NF received the data from connected device's COM port, KB3031-NF will send this data as message to the Control number.

SMS control number: it can be set three numbers; this parameter is valid when KB3031-NF work as SMS Modem and set to type B, this parameter and Control number

(total: four numbers) plays the role of SMS filtering, in case of spam messages. if KB3031-NF (type B) receive a message, determine whether this one of four numbers, if yes, then receive messages and transfer to a COM port, and update the number as the Control number, so that can transfer COM data to this number next time. If not the one of four numbers, it will lose this message.

5.3 Modify DTU basic parameter by SMS

KB3031-NF support DTU parameters configuration by SMS, before change the parameters by SMS, it needs to set the mobile number as center control number in product and set an operation password, then it can realize the DTU remote configuration by SMS, the detail command of modify DTU parameter please contact with our company for relevant person.

5.4 Modify DTU basic parameter by GPRS

In order to meet the needs of different customers, KB3030-N also support GPRS mode for remote modification of DTU basic parameters, but the premise of using the function is product work in the conventional protocol of the GPRS DTU mode, and server-side or client side support for remote modify DTU basic parameters of the agreement. If customers use our company server, all support this function, if not, you can contact our company related personnel access to the configuration or SDK to use this function.

6. SMS Modem

6.1 Overview

Under SMS MODEM work mode, user can set KB3031-NF as type A (Single) or type B (Transparent), Type A: KB3031-NF can send message to multi type B KB3031-NF, the target number is collect from the message protocol; Type B: KB3031-NF can only send message to appointed mobile number, the default number is Center control number, when KB3031-NF get any message from Center control number, SMS control number1, SMS control number2 or SMS control number3, it will collect the number as target mobile number.

User is advised to set the type of KB3031-NF as SMS Modem through the configuration software. Choose the data type of communication (HEX (default), ASCII and UCS2), then set KB3031-NF as type A (with protocol) or type B (transparent), if set it as type A (with protocol), user send data must according to the communication protocol provide by our company.

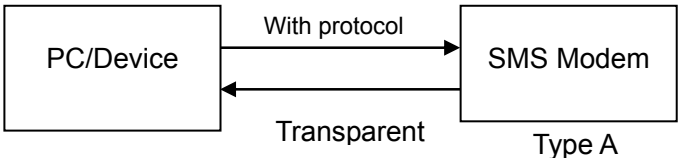
The synopsis of communication relationship between KB3031-NF and terminal equipment, KB3031-NF and KB3031-NF as below form:

Type	Communication port	Communication interface	Work status	With protocol	Note
A	COM port	COM Communication	Send data to device	None	Transparent data to device
			Received data from device/PC	With protocol	Get target number from the package
	Air	Air Communication	Send message	PDU	Send to type B or mobile
			Receive message	PDU	Receive any type B or mobile's message
B	COM port	COM Communication	Send data to device	None	Transparent data to device
			Received data from device	None	Get transparent data from device
	Air	Air Communication	Send message	PDU	Send message to the temp target number
			Receive message	PDU	Get the source number from message, then detect and filter the number, if passed then save it as temp target number.

The working principle of type A (with protocol) and type B (transparent) are as below:

6.2 Type A (Single protocol)

When the device which connected with type A and need to send data to type A, then must according to the protocol of our company to send data to type A, A will send data to target number according to protocol, After A received data, it will check the data type with protocol: 01 means Hex, 02 means ASCII, 03 means UCS2, if 00 means type A will convert the data to the designated data type after received data, then send the data to type B through PDU format, type A can receive the message from any phone number, analysis the message, convert the date to designated data type and sent it to COM port of device which connected with type A. In this type, "Control number" and "SMS Control number" doesn't work.



SMS modem with protocol

Type A, SMS Modem with protocol, it can be major transmitting port, user need protocol package to send data to the appointed number by message, Protocol form as follow:

Head (8bits)	TPL(8bits)	Target number	Data length(16bits)	Data(n bytes)	End（8bits）
0x7B	(HEX)	(ASCII)	(HEX)		0x7D

TPL：Send data format+ Target number length, the form is as below:

Send data format DATATYPE（2bit）	Target number length phoneLen（6bit）

DATATYPE：00 means Compatible with V0.1 agreement, 01 means HEX, 02 means ASCII, 03 means UCS2;

PhoneLen: Means Target number length;

Example 1: 7B 0B 31 38 39 32 32 38 34 33 31 35 31 00 06 31 32 33 34 35 36 7D, 0B means Compatible with V0.1 agreement, cell phone number length is 11 bytes, 31 38 39 32 32 38 34 33 31 35 31 represent cell phone number：18922843151, 0x0006 represent data length is 6 bytes, 31 32 33 34 35 36 represent message content: 123456.

Example 2: 7B 4B 31 38 39 32 32 38 34 33 31 35 31 00 06 31 32 33 34 35 36 7D，4B means the data format of this package is HEX, cell phone number length is 11 bytes, 31 38 39 32 32 38 34 33 31 35 31 represent cell phone number：18922843151, 0x0006 represent data length is 6 bytes, 31 32 33 34 35 36 represent message content: 123456.

Note: if data more than 70 bytes, the largest buffer is 512 bytes, SMS Modem according to the internal protocol, 70 bytes each message.

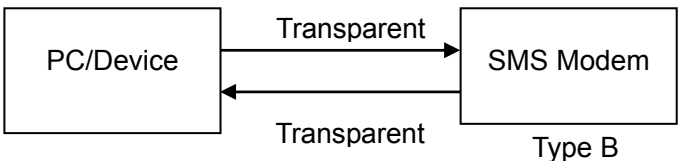
Sending data response protocol:

Head(8bits)	TPL (8bits)	Target number	Data length (16bits)	Function code(8bits)	End（8bits）
0x7B	(HEX)	(ASCII)	(HEX)	0x01 or 0x02	0x7D

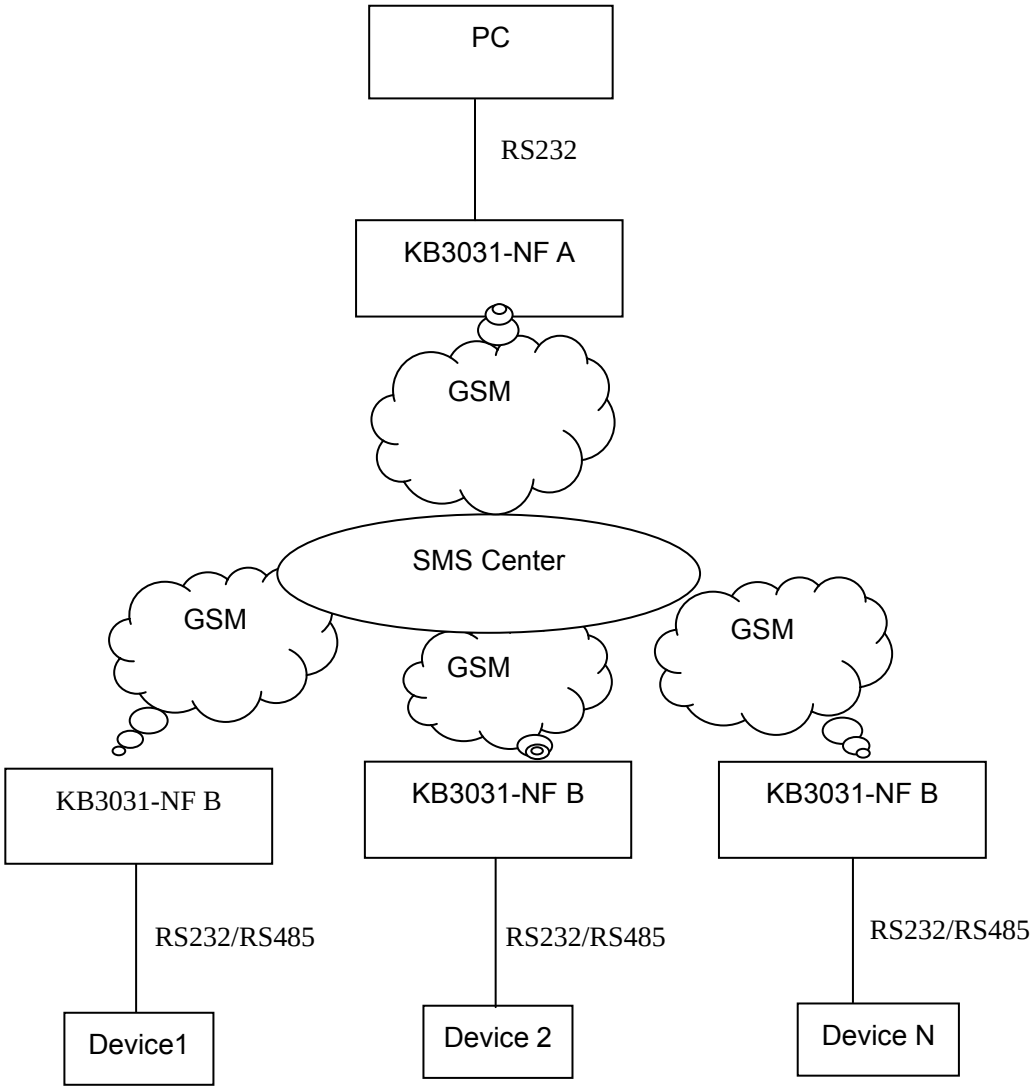
Function code: 0x01 means successful sending, 0x02 means failure sending.

6.3 Type B (Transparent)

If set KB3031-NF as type B, passive receive message, Type B will set the Control Number as temporary target number, after received message, type B will read the source number, if this number is the one of “Control number” or “SMS Control number”, then will update this number as temporary target number, Type B will convert the message to designated data type and send it to COM port of device which connected with type B. when type B received the data from device.



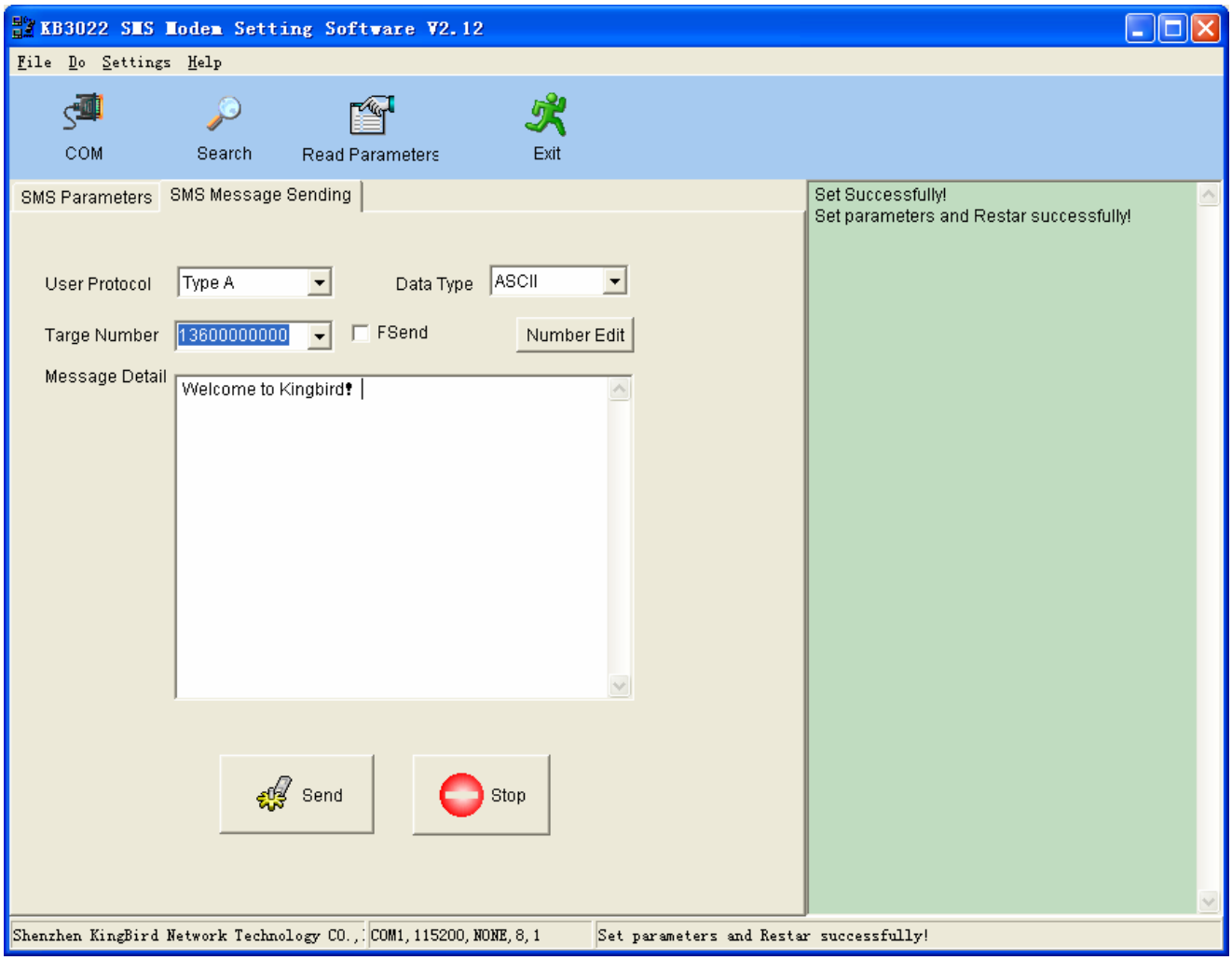
6.4 SMS Modem network



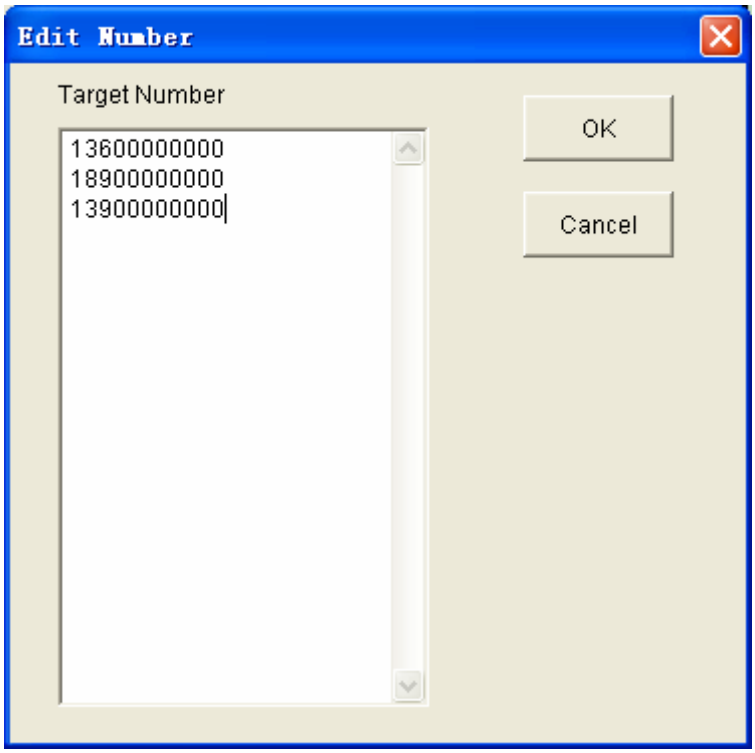
6.5 SMS Modem sending and receiving message

User can send and receive message through the configuration software provide by our company. Proceed as follows:

1. Run SMS_Modem.Exe software, first choose the COM connected to KB3031-NF and baud rate of COM port and so on, enter "SMS sending" page, show as follows:



2. Users according to the agreement type of current KB3031-NF to choose type A or type B, data type as HEX, UCS2 or ASCII. And then click " number edit" button, into a phone number edit window, input the target number, click edit" Set ", as below show:



3. If need to FSend, please select “Fsend” in main interface, if just send to one phone number, then select this number in the target phone number list box, click "send" button, this message is sent out, the software will tip sent successfully.

4. If it received message, it will show the messages’ details on the right of the information display box.

Note: this routine is only used for demo, customers can using any of the serial debugging assistant to test according to the above mentioned protocol.

7. DTU Remote Control

7.1 Dialing Control Sleep and Waking Up

1. Controlled center number on DTU should set to user's cell phone number, Please refer the 4th chapter for parameter setting details.

2. Use cell phone dial the SIM card number on DTU, if DTU is on working, DTU will break away from GPRS and enter into sleep pattern, and user can see the green light DTU will be off. In sleep pattern, no heartbeat and can not transmit data, no GPRS flow fee. If DTU is on sleep state, dial DTU number, it will be waked up and connected with server, then enter into normal working state.

7.2 Internet Remote configuration Parameter

User can set the DTU parameters through our's configuration software (the server software must be our company's Data Center software), but for safety's sake, user is not advised to set parameters through Internet.

8. IO Control—Reading And Setting

User can send instruction to DTU through server, to read and control the IO flow.

8.1 IO Input state Reading

1. Read：Server➔DTU

Head	GPRS ID	Zone	FUNCTION CODE	Zone enabled	PARITY
0xA881 (2bytes)	11bytes ASCII	4bytes ASCII	0x06 (1byte)	0x00 OR 0x01	CheckSum 1byte

State: CheckSum is a accumulation data form FH to PARITY, if the data greater than 255, then choose 256 pattern, (The Remainder by divided 255)

For example: A8 81 30 30 30 30 30 30 30 30 30 30 31 30 30 30 31 06 01 02, represent that reading the DTU's(GPRS ID: 00000000001, Zone: 0001, Zone enabled: true.) IO status.

2. Reply: DTU➔Server(or active report all this format when IO state response and change input interface)

Head	GPRS ID	Zone	FUNCTIONCODE	Zone enabled	IO STATE	PARITY
0xA881 (2bytes)	11bytes ASCII	4bytes ASCII	0x07 (1byte)	0x00 or 0x01	2bytes	CheckSum 1byte

Notice:

1. IO Port State: High Level: ox01, Low level: ox00, in proper order is 6, 10.
2. When set the DTU IO automatic alarm Open, and the input terminals 6, 10 feet of DTU is to the corresponding threshold, DTU will sent alarm information to server automatically, alarm information is this format.

8.2 Output state of IO flow settings

1. Setting: Server➔DTU

Head	GPRS ID	Zone	FUNCTION CODE	Zone enabled	IO STATE	PARITY
0xA881 (2bytes)	11bytes ASCII	4bytes ASCII	04 (1byte)	0x00 或 0x01	2bytes	CheckSum 1byte

State: Output port state: high level: ox01, low level:ox00

2．Reply: DTU➔Server

Head	GPRS ID	Zone	FUNCTION CODE	Zone enabled	IO STATE	PARITY
0xA881 (2bytes)	11bytes ASCII	4bytes ASCII	0x05 (1byte)	0x00 或 0x01	2bytes	CheckSum 1byte

State: Output port state: high level: ox01, low level: ox00

9．KB3031-NF Application Guide

9.1 Operation Steps:

(1)．Plug in SIM card;

(2)．Connect the antenna;

(3)．Set DTU Parameters;

Connect the data cable. DTU's user interface is 10PIN socket, If DTU is RS232 interface, you can connect it with DB9 of COM port, if DTU is RS485 interface, and you can use one converter of RS232-RS485(or RS485-USD converter) to connect it with DB9 of COM port.

Run the configuration software, choose and open all the COM port that DTU connected;

Connect with the Power. The power adaptor(5V) is One of the enclosures，first you can plug the power adaptor into the power socket, then connect the male into the female socket of the power cable. DTU can get power. KB3031-NF DTU Setting Software will list the menu of configuration. You can choose different menu to set different parameters, such as server IP, port, baud rate and so on. (Baud rate and Verify must be same with the device), then save the parameters and reset DTU.

(4)．Connect DTU with the device

Connect DTU with the device according to the interface define of DTU. If DTU is RS232 interface, you can connect it with the device of RS232, If the DTU is RS485 interface, you can connect it with device of RS485.

(5)．Star the control center software or the SCADA software to collect the remote device's data.

9.2 User utility software R&D and server planning

Users need planning on R&D software which in GPRS application, user can choose fixed IP servers or dynamic domain mode. Based on dynamic DNS is unstable, User is not advised to adopt this way. Here is the explain for the planning on software R&D based on fixed IP servers

Fixed IP server user can rent or hosting ISP Internet service provider, or can apply special line to our server.

Generally speaking, user's monitoring software can divide into two modes:

One is the user monitoring software and Data center software (Data center) integration. Namely the user monitoring software is installed on the Server, and its working mode as Server, it communicate with and manage every scene DTU directly, the advantage of this way is communication directly, no data transfer, Disadvantage is that the flexibility for application is not strong, server must be in the user's master-control room (special line). So that users just can monitor and data collect in that server only.

Another is the user monitoring software and Data Center software (Data Center) separation, Data Center dedicated to Data transfer and each machine DTU's management, monitoring software only in charge of the customer's business logic processing, it communicate with Data Center software through network, and it with Data Center software is C/S architecture, the monitoring software working mode as Client, and Data center as Server. The advantage of this way is very flexible application, user no need special line, only need place the server in ISP service provider, and install Data center software into server. User can manage it only by user's monitoring software, and when monitoring software install into a computer which connect with internet, it can achieve communication even in company or on business trip outside. The disadvantage of this mode is data need to transfer, monitoring software is not communicate with DTU directly, But communicate with data center software first, and then forward data to scene DTU.

Users can plan the whole GPRS application system according to user's request. Normally, users are suggested using the second modem, our company's server and server software is available to offer a lot of support when user debugging and trial in the early time. If users develop software completely, Our company can offer SDK or Demo program when user monitoring software work as the server (when user monitoring software and data center software is integration) or Client (when user monitoring software and data center software is separation).

9.3 Use GPRS and SMS for communication in the same time

Generally speaking GPRS DTU with only GPRS communication function, but sometimes in GPRS data communication, also needs SMS communication. It can use SMS as backup communications when GPRS communication interrupt, or it can send out a warning through SMS to users mobile phone when abnormal situation.

Receive SMS message: when under DTU mode, KB3031-NF can receive SMS, and send the SMS to the user equipment through serial port, but only available for the message from message control number. KB3031-NF refuse to receive the message from any other number, to avoid the interference to users' equipment from spam messages.

Send SMS messages: when under DTU mode, it gets the data from device's COM port and sends it to server via GPRS, but if user needs to send data by SMS to Mobile phone or other SMS terminal, user can change working mode to SMS Modem through switch Pin 10 to low. Then the data from the user terminal can be send to Message control number or terminal by SMS.

10. “Plug and play” of KB3031-NF

When users don't want to or can not do software development based on customary communication to use GPRS, then can use “plug and play”. If user can develop software, then need not to use "plug and play".

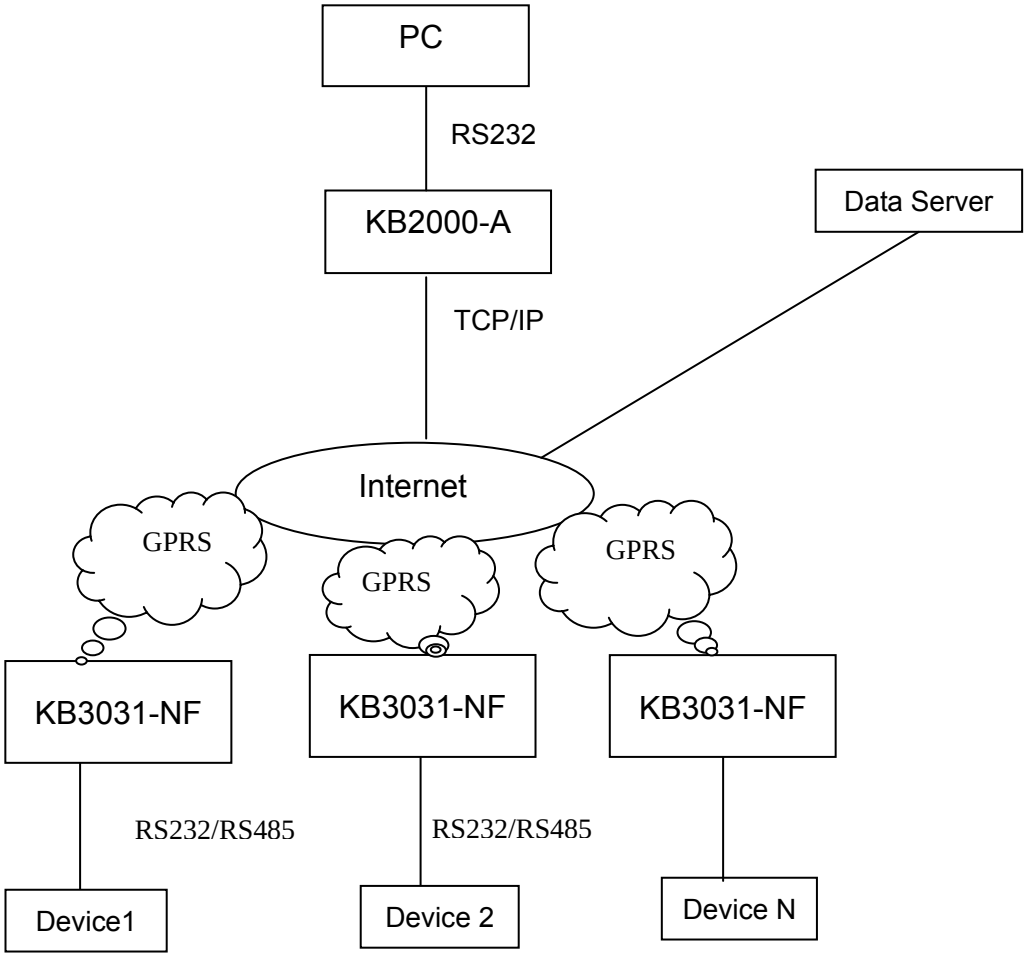
Normally, users monitoring software based on serial communication mode before user use GPRS, if user want to use GPRS system, user is advised to change the communication mode to network communication mode, meanwhile, Put the protocol of GPRS DTU in monitoring software (Invoke SDK from DTU manufacturers) and building server and so on many developments and applications. My company recommends "plug and play" solutions, user doesn't need to change its monitoring software, when users get our product, through my company's some software support, it can achieve remote GPRS communication through the monitoring software base on COM port communication modem. User can build a large SCADA system with our products and software in 10 minutes. In early time user debugging and try our products, user can use our server. If the bulk application is still need to adopt our company server, also can lease my company server.

Our company products "plug and play" solution requires our server software (Center Data) to support, the following various network scheme adopts our company's server software (installed in users server or our company server).

10.1 KB3031-NF work with KB2000

KB3031-NF GPRS DTU can be used with KB2000-A (our product). If your software is based on serial COM, and device is COM port too (RS232 or RS485), then you can chose this Plan. This network is plug and play way. It need not any development of software and hardware User need to hire our company’s server. It can peer to peer and center to multi-point. This type network is very suit for the situation that device and the PC software are based on the COM port communication, and they need remote communication. Such as LED display information release and so on.

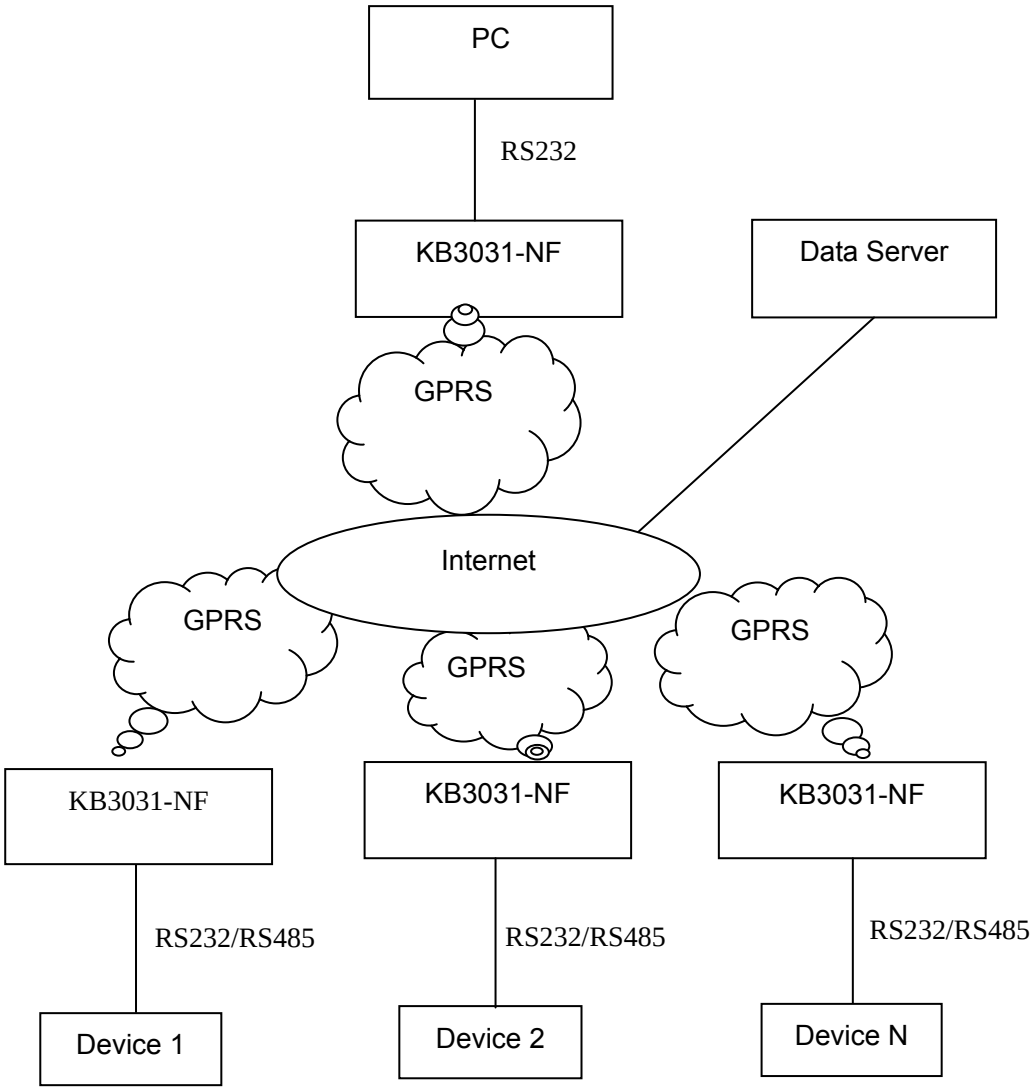
The network topology as follow:



10.2 KB3031-NF Work with KB3031-NF

KB3031-NF can use with KB3031-NF. When the master control room has no condition to surf the internet, user can use a KB3031-NF as main station, and use another KB3031-NF connected with device as slave station. This way is called plug and play (foolish application), no need to develop any software. User can use own server, or ours. Not only peer to peer, but also center to multi-point. This type network is very suit for the situation that main controlled room has no condition to surf the internet or outdoor, but need remote data communication.

Connected net system structure as follow:

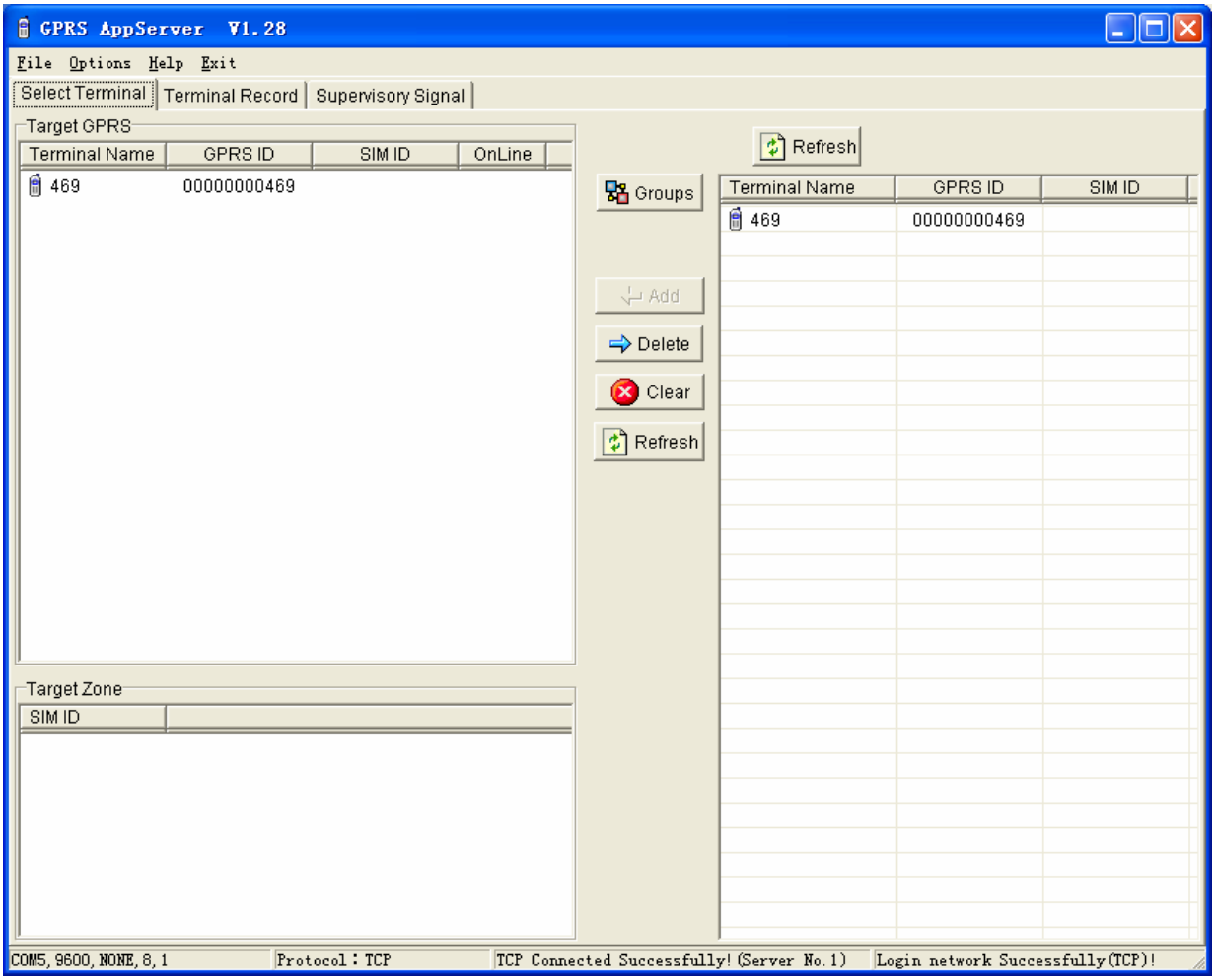


10.3 Appserver software work with KB3031-NF

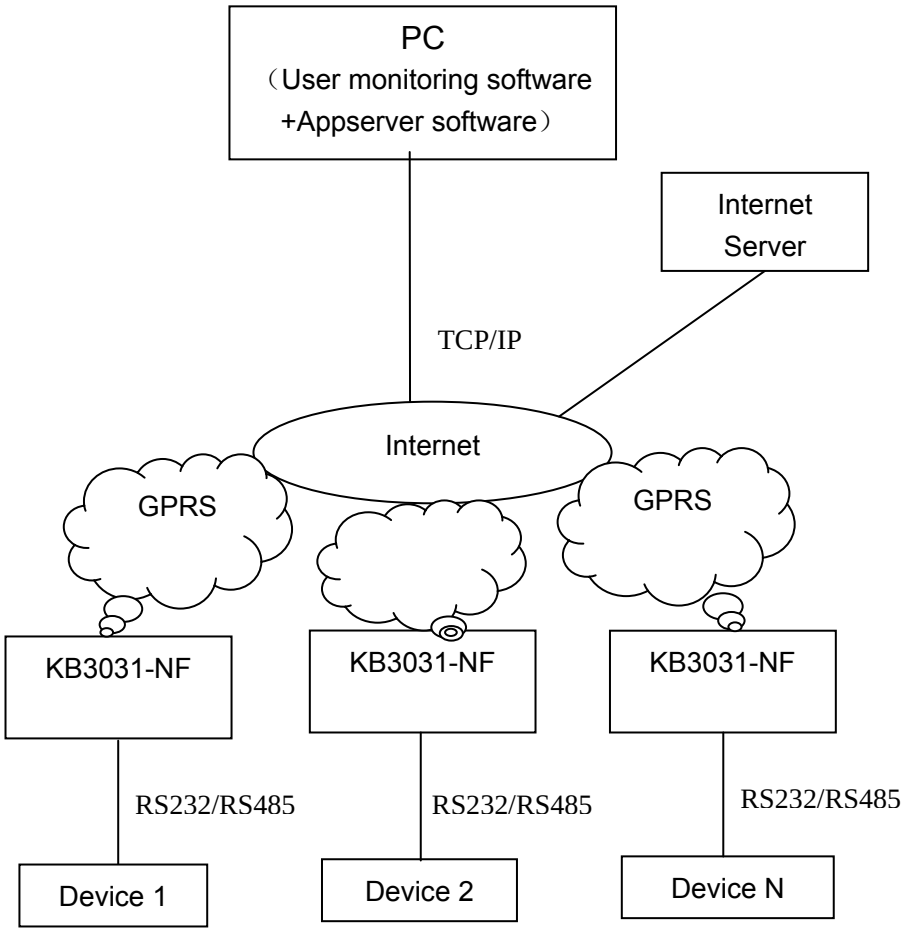
Appserver software is the client-side communication software developed by our company and application in one single host or multi host system, the single host or multi hosts in network are need data communications with the equipment. Appserver software can combine to use with user's device control software (based on COM port), it can obtain the data in user's device control software through COM part and send the data to the KB3031-NF. In this way, when a host needs to communicate with device, Appserver software send TCP connection request to designated server, then communication with it. At

the same time, the KB3031-NF which connected with device sends the TCP connection request to server, after connection established, KB3031-NF can communicate with server, then user can use Appserver software in host communicate with every KB3031-NF through server. This network mode is very suitable for that equipment and PC software are serial communication mode, and need for remote data communication projects. Such as, LED display information issue system and so on.

The Appserver interface as follow:



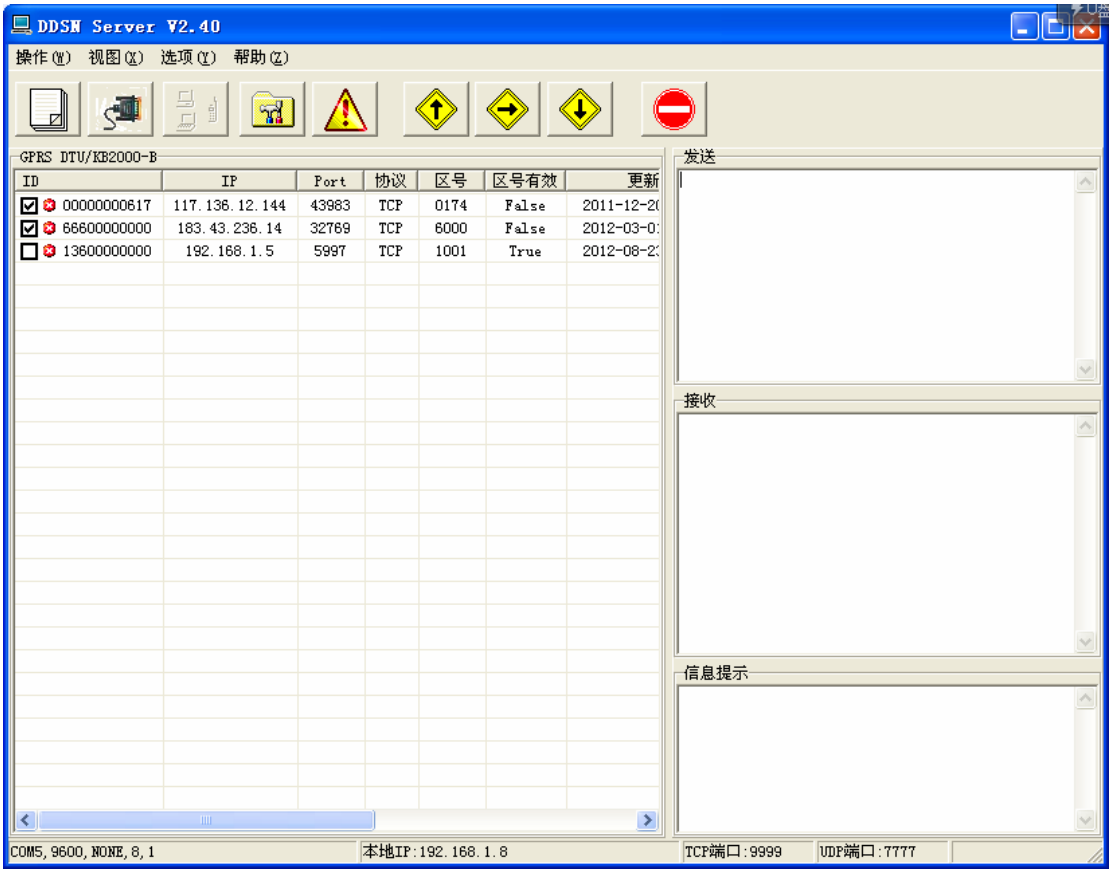
The system schematic structure as follow:



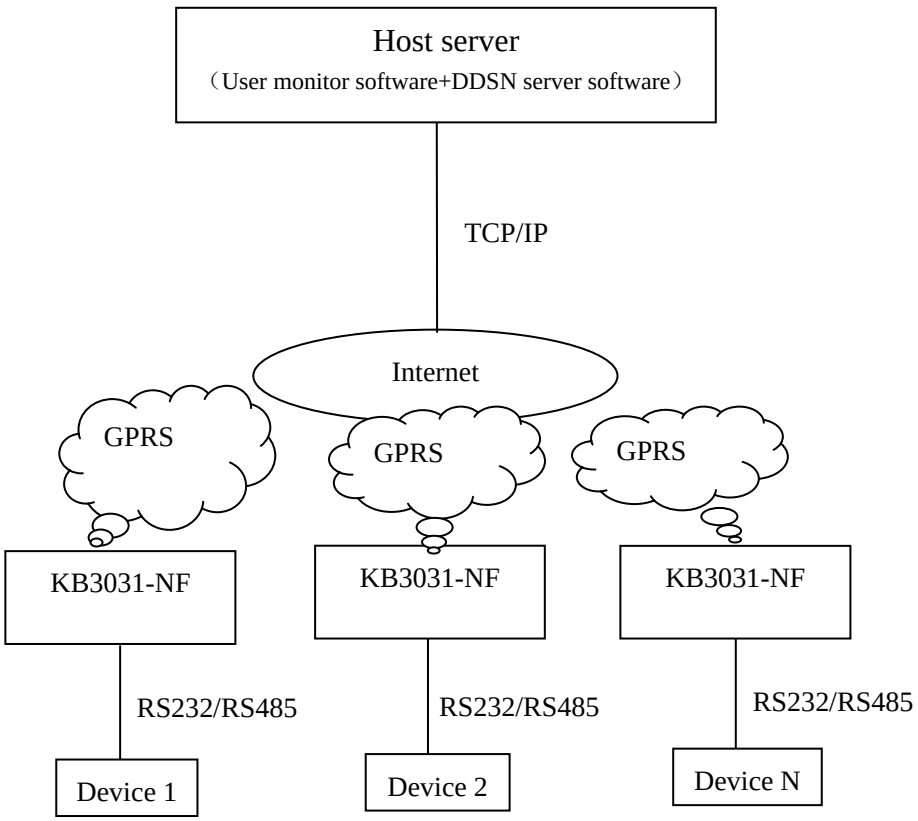
10.4 DDSN server software work with KB3031-NF

DDSN software is the server-side communication software developed by our company which can network with the device monitor software (based on COM), it can get the monitor software data and send it to local KB3031-NF. It applies in one single host or multi host system, when the single host or multi hosts in network both need to communicate with local equipments. DDSN software accept the TCP connecting request from KB3031-NF and communication. This network mode is very suitable for that equipment and PC software are serial communication mode, user have own server or Through the dynamic domain name or port mapping mode project.

DDSN server software interface as below:



The system schematic structure as follow:



11. Modem

Switch to Modem work mode: COM port, SMS and GPRS, when under Modem working mode, user can achieve the function through AT command; user must be familiar with AT command.

User can achieve the function according to application that dial-up, make phone call, send and receive SMS, or GPRS transmission, and so on.